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(54) POLISH COMPOSITIONS

(71) We, DOW CORNING LIMITED, a British Company of 12 Whitehall, London, S.W.1, formerly Midland Silicanes Limited of Reading Bridge House, Reading, Berkshire, England, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to polishing compositions containing amino-substituted polysiloxanes.

It has long been known to incorporate polydimethylsiloxanes into wax-containing furniture and automobile polish compositions to improve the ease of rub-out of the polish and the appearance thereof after application. A more recent development is the incorporation into wax-containing polishes of polysiloxanes having a proportion of amine substituents. This development is described, for example, in U.K. Patents Nos. 1162772 and 1237080. Polishes containing amino-substituted polysiloxanes exhibit significantly improved resistance to washing. It has, however, been found that such polishes suffer from the disadvantage of "streaking" when applied to certain types of painted surfaces, particularly melamine alkyd and nitrocellulose coated surfaces.

We have now found that the said disadvantage may be minimised and even eliminated by including in the polishing composition a specific type of organosilicon resinous copolymer.

According to this invention there is provided a wax-containing polishing composition wherein there is also present (a) from 0.2 to 10 percent by weight of (i) a polyorganosiloxane of the unit general formula

$$R_nSiO_{\frac{4-n}{2}}$$

wherein n has an average values of from 1.8 to 2.1 in which from 0.25 to 10 per cent of the total R substituents are selected from radicals of the formula

$$-R'NHX$$

and radicals of the formula

$$-R'NHCH_2CH_2NH_2,$$

in which R' represents a divalent hydrocarbon radical having 3 or 4 carbon atoms and X represents a hydrogen atom or an alkyl radical having less than 10 carbon atoms, the remaining R substituents being selected from monovalent hydrocarbon radicals and alkoxy radicals having less than 5 carbon atoms, not more than 20 per cent of the remainder being alkoxy radicals, and/or (ii) an acid salt of polyorganosiloxane (i), and (b) from 0.1 to 5% by weight of a resin copolymer of SiO_2 units and $(CH_3)_3SiO_{0.5}$ units, the ratio of SiO_2 units to $(CH_3)_3SiO_{0.5}$ units being in the range from 0.7:1 to 2.4:1, the proportions of (a) and (b) being based on the total weight of the polishing composition.

The polyorganosiloxanes (i) which are present in the polishing compositions of this invention are those of the unit general formula

$$R_nSiO_{\frac{4-n}{2}}$$

in which R and n are as defined above. At least 0.25 per cent and up to 10 per cent of the total substituents are radicals of the formula

$$-R'NHX$$

and/or

$$-R'NHCH_2CH_2NH_2.$$

From considerations of cost the preferred

[*Price 25p*]

polyorganosiloxanes (1) are those in which the specified amino-substituted groups comprise from 1 to 5 per cent of the total.

In the polyorganosiloxane (i) R′ represents a divalent hydrocarbon radical having 3 or 4 carbon atoms and X represents a hydrogen atom or an alkyl radical having less than 10 carbon atoms, for example methyl, ethyl, butyl, hexyl or nonyl. Examples of the operative amine substituted groups therefore are the gamma-aminopropyl and delta-aminobutyl radicals and radicals of the formulae

$$-(CH_2)_3NHCH_3,$$

$$-(CH_2)_3NHCH_2CH_2NH_2$$

$$-(CH_2)_4NHCH_2CH_2NH_2$$

and

$$-(CH_2)\underset{\displaystyle CH_3}{\underset{|}{C}}HCH_2NHCH_2CH_2NH_2$$

The remaining R substituents in the polyorganosiloxone (i) are selected from monovalent hydrocarbon radicals and alkoxy radicals having less than 5 carbon atoms, not more than 20% of the remainder being the said alkoxy radicals. Examples of such radicals are methyl, ethyl, propyl, butyl, hexyl, decyl, tetradecyl, octadecyl, methoxy, ethoxy and isopropoxy. Preferably the R substituents in the polyorganosiloxane (i) are the specified amino-substituted radicals and methyl radicals, with or without a small proportion (e.g. up to 5 per cent of the total) of methoxy and/or ethoxy radicals.

Examples of the preferred polyorganisiloxanes (i) are copolymers comprising dimethylsiloxane units and methyl (delta-aminobutyl) siloxane units or methyl (gamma-aminopropyl) siloxane units and copolymers comprising dimethylsiloxane units and methyl (N-beta-aminoethyl - gamma - aminopropyl)siloxane units or methyl (N - beta - aminoethyl - gamma - amino - isobutyl) siloxane units. If desired the copolymers may be end-stopped with suitable chain terminating units for example triorganosiloxy units such as trimethylsiloxy units, diphenylmethylsiloxy units and dimethylvinylsiloxy units. Also if desired the specified aminosubstituted radicals may be present in the terminal position of the polymer chain, for example in a chain terminating unit such as the dimethyl(gamma-aminopropyl) siloxy unit or the methyl(methoxy)(N - beta - aminomethyl - gamma - amino propyl)siloxy unit.

The polyorganosiloxanes (i) and their use in detergent resistant polishes are well known in the art, see for example U.K. Patents Nos. 1162772 and 1237080. They may be obtained for example, by equilibration of the hydrolysates of the appropriate hydrolysable silanes or by equilibration of the appropriate cyclic siloxanes. If desired a source of end-stopping units e.g. hexamethyldisiloxane may also be included.

The polyorganosiloxanes (i) may also be prepared by reacting a hydroxyl terminated polydimethylsiloxane and a silane containing alkoxy groups and amino groups as described in U.K. Patent No. 1162772.

The acid salts (ii) of the polyorganosiloxanes (i) may also be employed in the compositions of this invention. Methods of preparing the salts are wellknown and they may be readily obtained by the reaction of the amino-substituted polyorganosiloxane with the appropriate acid, e.g. formic acid, acetic acid, propionic acid, oxalic acid, malonic acid, benzoic acid, hydrochloric acid, hydriodic acid, phosphoric acid and sulphuric acid.

The polyorganosiloxanes and their acid salts (a) may vary in consistency from freely-flowing liquids to highly viscous gum-like materials. Those having viscosities within the range from 100 to 100,000 cS at 25°C are normally preferred as they are more readily incorporated into the polishing composition. Preferably they are employed in a proportion of from 0.5 to 5 per cent by weight based on the total weight of the polishing composition.

As component (b) of the polishing compositions of this invention there is employed a resin copolymer of SiO_2 units and

$$(CH_3)_3SiO_{0.5}$$

units in which the ratio of the former to latter lies within the range from 0.7:1 to 2.4:1. Such copolymers are well-known materials. They can be prepared by the cohydrolysis of

$$(CH_3)_3SiY \quad \text{and} \quad SiY_4$$

in which Y is a hydrolysable atom or radical, for example a chlorine atom. Another method for preparing such copolymers comprises reacting for example

$$(CH_3)_3SiCl$$

or

$$(CH_3)_3SiOSi(CH_3)_3$$

with an acidic silica sol, as described in Specification No. 706719.

The resin copolymer (b) is used in an amount of from 0.1 to 5 per cent, preferably from 0.2 to 2 per cent, by weight based on the total weight of the polishing composition. Most conveniently the resin copolymer is incorporated with the polishing composition as a solution in an organic solvent, for example, toluene, xylene, white spirit or benzene.

The wax-containing polish compositions of this invention are preferably aqueous based and normally take the form of oil-in-water emulsions. They may, however, also take the form of oil-in-water emulsions or may, if desired, be formulated with the aid of organic solvents as solutions, pastes or aerosols.

As the wax component the composition may contain any of those known in the formulation of polishes. Examples of such waxes are microcrystalline wax, polyethylene wax, beeswax, carnauba wax, ozokerite, Montan wax and paraffin wax. Any of the conventional additives, for example abrasives, solvents, emulsifying agents, thickeners and colouring matter may also be present in the compositions. There may also be included in the polish formulation known silicone additives such as dimethylpolysiloxanes and siloxane/amine reaction products which function as gloss improvers.

The polishing compositions of this invention may be used with advantage on any surface to which a polish is normally applied. They are, however, particularly useful as automobile polishes, especially those having a finish of nitrocellulose, melamine alkyd or acrylic.

The following example, in which the parts are expressed by weight, illustrates the invention.

Example

Three separate mixtures, A, B and C were prepared using the following ingredients.

Mixture A

	parts
Petrolite C36 Wax (Petrolite is a registered trade mark)	5
Oleic Acid	5
Polydimethylsiloxane (350 cS at 25°C)	3
White Spirit	20

Mixture B

	parts
Amino-silicone*	1
Resin copolymer†	1
White Spirit	5

*T trimethylsiloxy end-stopped copolymer of 95 mol per cent dimethylsiloxane units and 5 mol per cent methyl (beta - aminomethyl - gamma - aminoisobutyl) siloxane units having a viscosity of 3000 cS at 25°C.

† A 50% by weight solution in white spirit of a copolymer of SiO_2 units and

$$(CH_3)_3SiO_{0.5}$$

units in which

$$(CH)_3SiO_{0\text{-}5}/SiO_2=0.87.$$

Mixture C

Morpholine	2 parts
Water	48 parts
Colour	q.s.

Mixtures A, B and C were each heated to about 85°C and A then added to C with stirring until a homogeneous product was obtained having a pH in the range from 7 to 7.8. To the homogeneous product Mixture B was then added slowly with stirring and the temperature allowed to fall to 55°C. At this temperature 10 parts of Kapolite registered trade mark) SFL (an abrasive) was introduced and the mixture stirred until cool.

The product thus obtained was a pourable oil in water emulsion. This was used to polish a portion of the surfaces of metal plates which had been painted with acrylic, melamine-alkyd and nitrocellulose paints. To the remaining portions of the plates was applied, as control, a similar emulsion polish except that it contained no resin copolymer.

Heavy streaking was observed on the melamine alkyd and nitrocellulose surfaces with the control polish. Some streaking was also detectable on acrylic finishes of certain colours. No streaking was observed on any of the portions treated with the polish containing the resin copolymer.

WHAT WE CLAIM IS:—

1. A wax-containing polishing composition wherein there is also present (a) from 0.2 to 10 percent by weight of (i) a polyorganosiloxane of the unit general formula

$$R_nSiO_{\frac{4-n}{2}}$$

wherein n has an average value of from 1.8 to 2.1 and in which from 0.25 to 10 per cent of the total R substituents are selected from radicals of the formula

$$—R'NHX$$

and radicals of the formula

$$—R'NHCH_2CH_2NH_2,$$

in which R′ represents a divalent hydrocarbon radical having 3 or 4 carbon atoms and X represents a hydrogen atom or an alkyl radical having less than 10 carbon atoms, the remaining R substituents being selected from monovalent hydrocarbon radicals and alkoxy radicals having less than 5 carbon atoms, not more than 20 per cent of the remainder being alkoxy radicals, and/or (ii) an acid salt of polyorganosiloxane (i), and (b) from 0.1 to 5% by weight of a resin copolymer of SiO_2 units and $(CH_3)_3SiO_{0\text{-}5}$ units, the ratio of SiO_2 units to $(CH_3)_3SiO_{0\text{-}5}$ units being in the range of from 0.7:1 to 2.4:1, the proportions of (a) and (b)

being based on the total weight of the polishing composition.

2. A composition as claimed in claim 1 wherein the polyorganosiloxane and/or its acid salt (a) has a viscosity within the range from 100 to 100,000 cS at 25°C.

3. A composition as claimed in claim 1 or claim 2 wherein the polyorganosiloxane and/or its acid salt (a) is present in a proportion of from 0.5 to 5 per cent by weight based on the total weight of the polishing composition.

4. A composition as claimed in any one of the preceding claims wherein the resin copolymer (b) is present in a proportion of from 0.2 to 2 per cent by weight based on the total weight of the polishing composition.

5. A composition as claimed in any one of the preceding claims which is an oil-in-water emulsion.

6. A polishing composition as claimed in any one of the preceding claims substantially as described with reference to the Example.

7. A method of polishing a surface which comprises applying thereto a composition as claimed in any one of the preceding claims.

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